

PCT COOPERATION TREATY

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Commissioner
 US Department of Commerce
 United States Patent and Trademark
 Office, PCT
 2011 South Clark Place Room
 CP2/5C24
 Arlington, VA 22202
 ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

Date of mailing (day/month/year)

28 May 2001 (28.05.01)

International application No.

PCT/US99/20389

Applicant's or agent's file reference

DN1999186PCT

International filing date (day/month/year)

07 September 1999 (07.09.99)

Priority date (day/month/year)

Applicant

CHANG, Ching-Chian et al

1. The designated Office is hereby notified of its election made:



in the demand filed with the International Preliminary Examining Authority on:

09 March 2001 (09.03.01)



in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was

was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO
 34, chemin des Colombettes
 1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorized officer

Philippe Bécamel

Telephone No.: (41-22) 338.83.38

PATENT COOPERATION TREATY

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GOODYEAR PATENT
& TRADEMARK DEPT.

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From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:

Wheeler, David E.
THE GOODYEAR TIRE & RUBBER COMPANY
Department 823
1144 East Market Street
Akron, Ohio 44316-0001
ETATS-UNIS D'AMERIQUE

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL PRELIMINARY EXAMINATION REPORT (PCT Rule 71.1)

Date of mailing
(day/month/year) 07.01.2002

Applicant's or agent's file reference
DN1999186PCT

IMPORTANT NOTIFICATION

International application No.
PCT/US99/20389

International filing date (day/month/year)
07/09/1999

Priority date (day/month/year)
07/09/1999

Applicant
THE GOODYEAR TIRE & RUBBER COMPANY et al.

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

4. REMINDER

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

Name and mailing address of the IPEA/

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D-80298 Munich
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Authorized officer

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PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference DN1999186PCT	FOR FURTHER ACTION <div style="text-align: right; font-size: small;">See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)</div>	
International application No. PCT/US99/20389	International filing date (day/month/year) 07/09/1999	Priority date (day/month/year) 07/09/1999
International Patent Classification (IPC) or national classification and IPC B29C47/00		
Applicant THE GOODYEAR TIRE & RUBBER COMPANY et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 6 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 4 sheets.

3. This report contains indications relating to the following items:

I ☒ Basis of the report

II ☐ Priority

III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

IV ☐ Lack of unity of invention

V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

VI ☐ Certain documents cited

VII ☒ Certain defects in the international application

VIII ☐ Certain observations on the international application

Date of submission of the demand 09/03/2001	Date of completion of this report 07.01.2002
Name and mailing address of the international preliminary examining authority: <div style="display: flex; align-items: center;"> <div> European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465 </div> </div>	Authorized officer Kujat, C Telephone No. +49 89 2399 2360



INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/US99/20389

I. Basis of the report

1. With regard to the elements of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17):*)
Description, pages:

1-20 as originally filed

Claims, No.:

1-15 as received on 19/10/2001 with letter of 17/10/2001

Drawings, sheets:

1/5-5/5 as originally filed

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/US99/20389

☐ the drawings, sh ets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-14
	No:	Claims	15
Inventive step (IS)	Yes:	Claims	1-14
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-15
	No:	Claims	

2. Citations and explanations
see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:
see separate sheet

R Item V

Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following documents:

- D1: WO 98 13185 A (CHANG CHING CHIAN ;VOGLIANO ROBERT HENRY (US); SHAW CHENG (US); GO) 2 April 1998 (1998-04-02) cited in the application
- D2: JP 01 304924 A (BANDO CHEM IND LTD), 8 December 1989 (1989-12-08) cited in the application

- 1.1 The subject-matter of independent method claim 1 differs from the disclosure of document D2 in that
- a) the gap height h_2 of the gate is larger than the average length of said fibre (feature F1), and
 - b) the viscosity of said elastomer is maintained at Mooney viscosity of 30 to 80 (feature F2) and in that the elastomer is processed at a speed of 100 to 1000 mm/sec linear speed at the gate (feature F3) and 1 to 100 mm/sec in the expansion cavity (feature F4).
- 1.2 The problem underlying the present invention may therefore be regarded as providing an alternative method of continuously producing fibre reinforced elastomer components.
- 1.3.1 Feature F1 is neither disclosed nor rendered obvious by D2, since D2 discloses "staple fibres". The skilled person knows that staple fibres usually are longer than 3 mm, which is the biggest gate height W_i disclosed in D2.
- 1.3.2 Features F2 to F4 relate to specific process conditions and geometric relations between gate and expansion cavity (feature F4). Such specific values are neither disclosed nor rendered obvious by D2.
- 1.4 The subject-matter of independent method claim 1 therefore meets the requirements of Art 33 (1) - (3) PCT.

- 1.5 **Claims 2 to 10** are dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step.
- 2.1 The subject-matter of independent apparatus **claim 11** differs from the disclosure of document **D1** in that the expansion cavity has an opening in order to allow the extrudate to leave the expansion cavity.
- 2.2 The problem underlying the present invention may therefore be regarded as improving productivity.
- 2.3 Document D1, which is considered representing the closest prior art for claim 11, discloses a discontinuous process, which makes use of a conventional injection mould. The skilled person must exercise inventive skill in order to arrive at the continuous process of claim 11. The subject-matter of independent apparatus **claim 11** therefore meets the requirements of Art 33 (1) - (3) PCT.
- 2.4 **Claims 12 to 14** are dependent on claim 11 and as such also meet the requirements of the PCT with respect to novelty and inventive step.
- 3.1 In the description, the applicant discloses that the fibres used in the present invention are "short fibres" (see e.g. page 4, line 8 and page 6, line 22). The fibre-reinforced elastomer component produced according to the method of claim 1 does not seem to differ from the fibre-reinforced composite article of document **D1**. Especially, since D1 also discloses "short fibres" (see claim 1 of D1), relates to the manufacture of tires (page 9, lines 24 to 26) and was filed by the applicant.
- 3.2 As the use of a fibre reinforced elastomer component having the properties obtainable by the method of claim 1 in a pneumatic tire is already known from D1, the subject-matter of independent **claim 15** lacks novelty over D1.

Re Item VII

Certain defects in the international application

- 4.1 The **units** of pressure (psi), measure (inch), temperature (Fahrenheit) employed

throughout the entire description are not additionally expressed in terms of the units stipulated by Rule 10.1 PCT.

4.2 According to the requirements of Rule 11.13(m) PCT the same feature shall be denoted by the **same reference sign** throughout the application. This requirement is not met in view of the use of "gap height h_2 " in claim 1 and "gap height h_1 " in claim 9 and "height h_1 " and "height h_2 " (description, e.g. page 4, lines 30 and 31).

4.3 Independent product claim 15 is not in the **two-part form** in accordance with Rule 6.3(b) PCT, which in the present case would be appropriate, with those features known in combination from the prior art being placed in the preamble (Rule 6.3(b)(i) PCT) and with the remaining features being included in the characterising part (Rule 6.3(b)(ii) PCT).

Independent claim 15 should therefore be redrafted accordingly. If, however, the applicant is of the opinion that the two-part form would be inappropriate, then reasons therefor should be provided in the letter of reply. In addition, the applicant should ensure that it is clear from the description which features of the subject-matter of claim 15 are already known in combination from the prior art (see the PCT Guidelines, III-2.3a).

1. A method of continuously producing fiber reinforced elastomer components having length, depth and width and having fiber orientation at angles to the length direction of said component, the method comprising the sequential steps of
- 5 (a) extruding or injecting a fiber reinforced elastomer,
- (b) forcing said elastomer through a die (11) having a gate (12), whereby, if the length of the gate is long enough, the length direction of fibers will be oriented in the direction of the gate length l_2 when the elastomer leaves gate (12);
- 10 (c) providing an expansion cavity (14) in said die (11) adjacent to said gate (12);
- (d) controlling the viscosity of said elastomer such that the elastomer passes through said gate (12) as a ribbon (16) of elastomer;
- (e) maintaining the orientation of the fibers in the ribbon (16) as it folds in expansion cavity (14), the fibers ending up oriented in the direction of the height(h_1) of expansion cavity
- 15 (14), whereby the fibers (20) are substantially oriented perpendicular to the width W and parallel to the height h_1 of the elastomer extrusion (17) that exits expansion cavity (14);
- (f) collecting said component for storage or for direct use in an elastomeric product, characterized in that the gate (12) has a gap height h_2 larger than the average length of said fiber; in that
- 20 the viscosity of said elastomer is maintained at Mooney viscosity of 30 to 80, and in that the elastomer is processed at a speed of 100 to 1000 mm/sec linear speed at the gate (12) and 1 to 100 mm/sec in the expansion cavity (14).
2. The method of claim 1 wherein an injection mold (50) is used for orienting fibers in an elastomer and further comprising the steps of
- 25 - attaching die (11) to said injection mold (50);
- forcing polymer through a sprue (18) using a ram (52);
- collecting extrudate (17) having oriented fibers (20) therein on a collection roll (78).
- 30 3. The method of claim 2 comprising the step of
- applying a scrim (72) to said extrudate (17) as said extrudate is collected.
4. The method of claim 2 comprising the steps of

- applying a pressure of 10 to 30 thousand psi (69 to 207 MPa) on polymer (54) with ram (52);
- applying a clamp force of 35 tons (256 kN) with pneumatic arm (56) against die (11).

5 5. The method of claim 4 comprising the steps of

- selecting said die (11) such that the gate length l_2 is 0.75 inch to 1.25 inches (1,9 to 3,18 cm), the length l_1 of the expansion cavity is 0.60 inch to 1.25 inches (1,52 to 3,18 cm), the height h_1 of the expansion cavity is 0.01 inch (0,03 cm), the height h_2 of the gate is 0.14 inch (0,36 cm) and the gate width W is 5 inches (12,7 cm).

10

6. The method of claim 1 wherein an extruder (30) is used for orienting fibers in an elastomer, and comprising the steps of

- attaching an expanding die (11a) having a tapered runner (22) to the end (31) of extruder (30);
- 15 - feeding an elastomer and fiber into extruder (30) through inlet (32);
- mixing said elastomer in said extruder (30);
- feeding elastomer through end (31) of extruder (30) into tapered runner (22) of die (11a), and
- collecting extrudate (17a) from die (11a).

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7. The method of claim 6 comprising the steps of

- maintaining the extrusion pressure in said extruder (30) at 5000 psi (34 MPa), and
- maintaining clamping pressure on said die at 5000 psi (34 MPa).

25 8. The method of claim 1, 2 or 6 comprising the further step of providing an expansion cavity (14) having a gap height h_1 of 10 to 100 times the gap height h_2 of said gate.

9. The method of claim 1, 2 or 6 comprising the further step of using a 1 to 6 phr Kevlar pulp as reinforcing fiber in said elastomer.

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10. The method of claim 1, 2 or 6 comprising the further step of forming a tire component with said die and the expansion cavity (14) has a length of 1.25 to 5.0 mm.

11. An apparatus for producing an elastomeric component comprising an injection mold (50) having
- (a) a chamber (55) for containing an elastomer (54);
 - 5 (b) a ram (52) for pressing elastomer (54) through sprue (18);
 - (c) a pneumatic arm (56) associated with a moving mold (10a) and a fixed mold (10b) attached to end (51) of injection mold (50), having die plates (11) disposed therebetween, whereby the die plates (11) comprise an expansion die (11) for changing the orientation of fibers (20) in an elastomeric material, said expansion die comprising:
 - 10 (d) at least one inlet (18) for directing an elastomeric material into said die;
 - (e) a narrow slit or gate (12) for receiving elastomer from said inlet (18), said gate (12) having a height h_2 and a length l_2 , the length of the gate being sufficient for forming said elastomer into a ribbon and orienting the length direction of fibers in the direction of the gate length l_2 when the elastomer leaves gate (12); and
 - 15 (f) a cavity portion (14) adjacent said gate (12), said cavity portion (14) having a length l_1 and height h_1 adapted to collect said ribbon (16) of elastomer and orient said fibers (20) substantially in the height direction of said cavity (14) forming thereby an elastomeric extrudate (17);
 - 20 characterized in that the expansion cavity (14) has an opening in order to allow the extrudate (17) to leave the expansion cavity (14).
12. The apparatus of claim 11 comprising injection mold (50) and roller system (70) comprising
- scrim take off roll (74) in proximity to pulley (76) which is adapted to direct scrim (72) and
 - 25 extrudate (17) to take up roll (78).
13. The apparatus of claim 11 wherein the expansion die (11) has a width W which corresponds substantially with the width of an elastomeric product or component.
- 30 14. The apparatus of claim 13 wherein the expansion die (11) has a gate (12) having a length of 1.25 to 5.0 mm and a height h_2 of said gate is 0.125 to 0.250 mm, and the ratio of said height to said length is 1/400 to 10/400.

15. Pneumatic tire including a fiber reinforced elastomer component obtained through the method of any of claims 1 to 10.

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference DN1999186PCT	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/US99/20389	International filing date (day/month/year) 07/09/1999	Priority date (day/month/year) [07/09/1999]
International Patent Classification (IPC) or national classification and IPC B29C47/00		
Applicant THE GOODYEAR TIRE & RUBBER COMPANY et al.		

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3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☒ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 09/03/2001	Date of completion of this report 07.01.2002
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Kujat, C Telephone No. +49 89 2399 2360 

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/US99/20389

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, pages:

1-20 as originally filed

Claims, No.:

1-15 as received on 19/10/2001 with letter of 17/10/2001

Drawings, sheets:

1/5-5/5 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/US99/20389

☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-14
	No:	Claims	15
Inventive step (IS)	Yes:	Claims	1-14
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-15
	No:	Claims	

2. Citations and explanations
see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:
see separate sheet

Re Item V

Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following documents:

D1: WO 98 13185 A (CHANG CHING CHIAN ;VOGLIANO ROBERT HENRY (US); SHAW CHENG (US); GO) 2 April 1998 (1998-04-02) cited in the application

D2: JP 01 304924 A (BANDO CHEM IND LTD), 8 December 1989 (1989-12-08) cited in the application

- 1.1 The subject-matter of independent method **claim 1** differs from the disclosure of document **D2** in that
- a) the gap height h_2 of the gate is larger than the average length of said fibre (feature F1), and
 - b) the viscosity of said elastomer is maintained at Mooney viscosity of 30 to 80 (feature F2) and in that the elastomer is processed at a speed of 100 to 1000 mm/sec linear speed at the gate (feature F3) and 1 to 100 mm/sec in the expansion cavity (feature F4).
- 1.2 The problem underlying the present invention may therefore be regarded as providing an alternative method of continuously producing fibre reinforced elastomer components.
- 1.3.1 Feature F1 is neither disclosed nor rendered obvious by **D2**, since D2 discloses "staple fibres". The skilled person knows that staple fibres usually are longer than 3 mm, which is the biggest gate height W_i disclosed in D2.
- 1.3.2 Features F2 to F4 relate to specific process conditions and geometric relations between gate and expansion cavity (feature F4). Such specific values are neither disclosed nor rendered obvious by D2.
- 1.4 The subject-matter of independent method **claim 1** therefore meets the requirements of Art 33 (1) - (3) PCT.

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/US99/20389

- 1.5 **Claims 2 to 10** are dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step.
- 2.1 The subject-matter of independent apparatus **claim 11** differs from the disclosure of document **D1** in that the expansion cavity has an opening in order to allow the extrudate to leave the expansion cavity.
- 2.2 The problem underlying the present invention may therefore be regarded as improving productivity.
- 2.3 Document D1, which is considered representing the closest prior art for claim 11, discloses a discontinuous process, which makes use of a conventional injection mould. The skilled person must exercise inventive skill in order to arrive at the continuous process of claim 11. The subject-matter of independent apparatus **claim 11 therefore meets the requirements of Art 33 (1) - (3) PCT.**
- 2.4 **Claims 12 to 14** are dependent on claim 11 and as such also meet the requirements of the PCT with respect to novelty and inventive step.
- 3.1 In the description, the applicant discloses that the fibres used in the present invention are "short fibres" (see e.g. page 4, line 8 and page 6, line 22). The fibre-reinforced elastomer component produced according to the method of claim 1 does not seem to differ from the fibre-reinforced composite article of document **D1**. Especially, since D1 also discloses "short fibres" (see claim 1 of D1), relates to the manufacture of tires (page 9, lines 24 to 26) and was filed by the applicant.
- 3.2 As the use of a fibre reinforced elastomer component having the properties obtainable by the method of claim 1 in a pneumatic tire is already known from D1, the subject-matter of independent **claim 15 lacks novelty over D1.**

Re Item VII

Certain defects in the international application

- 4.1 The **units** of pressure (psi), measure (inch), temperature (Fahrenheit) employed

throughout the entire description are not additionally expressed in terms of the units stipulated by Rule 10.1 PCT.

- 4.2 According to the requirements of Rule 11.13(m) PCT the same feature shall be denoted by the **same reference sign** throughout the application. This requirement is not met in view of the use of "gap height h_2 " in claim 1 and "gap height h_1 " in claim 9 and "height h_1 " and "height h_2 " (description, e.g. page 4, lines 30 and 31).
- 4.3 Independent product claim 15 is not in the **two-part form** in accordance with Rule 6.3(b) PCT, which in the present case would be appropriate, with those features known in combination from the prior art being placed in the preamble (Rule 6.3(b)(i) PCT) and with the remaining features being included in the characterising part (Rule 6.3(b)(ii) PCT).
Independent claim 15 should therefore be redrafted accordingly. If, however, the applicant is of the opinion that the two-part form would be inappropriate, then reasons therefor should be provided in the letter of reply. In addition, the applicant should ensure that it is clear from the description which features of the subject-matter of claim 15 are already known in combination from the prior art (see the PCT Guidelines, III-2.3a).

CLAIMS

1. A method of continuously producing fiber reinforced elastomer components having length, depth and width and having fiber orientation at angles to the length direction of said component, the method comprising the sequential steps of

(a) extruding, injecting or calendering a fiber reinforced elastomer such that fibers are oriented in the direction of processing of said elastomer,

(b) forcing said elastomer through a die (11) having a gate (12) having a gap height h_2 larger than the average length of said fiber,

(c) providing an abrupt expansion cavity (14) in said die (11) adjacent to said gate (12),

(d) maintaining the viscosity of said elastomer such that the elastomer passes through said gate (12) as a ribbon (16) of elastomer,

(e) compressing said ribbon (16) of elastomer in said expansion cavity (14) into an elastomer component such that said fibers are substantially oriented at angles to the processing direction in said expansion cavity (14),

(f) collecting said component for storage or for direct use in an elastomeric product,

wherein the viscosity of said elastomer is maintained at Mooney viscosity of 30 to 80, the elastomer is processed at a speed of 100 to 1000 mm/sec linear speed at the gate (12) and 1 to 100 mm/sec in the expansion cavity (14).

2. The method of claim 1 wherein an injection mold (50) is used for orienting fibers in an elastomer according to step (a), and further comprising the steps of

(g) attaching die (11) to said injection mold (50)

(h) forcing polymer through sprue (18) using ram (52)

(i) collecting extrudate (17) having oriented fibers (20) therein on a collection roll (78).

3. The method of claim 2 comprising the further step of applying a scrim (72) to said extrudate (17) as said extrudate is collected.

4. The method of claim 2 comprising the further steps of

(j) applying a pressure of 10 to 30 thousand psi on polymer (54) with ram (52).

(k) applying a clamp force of 35 tons with pneumatic arm (56) against die (11).

5. The method of claim 4 comprising the further steps of

(l) selecting said die (11) such that l_2 is 0.75 inch to 1.25 inches, l_1 is 0.60 inch to 1.25 inches, h_1 is 0.01 inch, h_2 is 0.14 inch and W is 5 inches.

6. The method of claim 1 wherein an extruder (30) is used for mixing fibers and an elastomer according to step (a), and comprising the further steps of

(g) attaching an expanding die (11a) having a tapered runner (22) to the end (31) of extruder (30)

(h) feeding an elastomer and fiber into extruder (30) through inlet (32)

(i) mixing said elastomer in said extruder (30)

(j) feeding elastomer through end (31) of extruder (30) into tapered runner (22) of die (11a), and

(k) collecting extrudate (17a) from die (11a)

7. The method of claim 6 further comprising the steps of

(l) maintaining the extrusion pressure in said extruder (30) at 5000 psi, and

(m) maintaining clamping pressure on said die at 5000 psi.

8. The method of claim 1 or 6 comprising the further step of controlling the viscosity of an elastomer, the speed of extrusion, the length, height and width of the gate (12) and the expansion cavity (14) to maintain control of fiber orientation in an elastomer according to the formula
% fibers oriented perpendicular to processing direction

$$\propto \text{extrusion pressure} \times \text{speed of extrusion} \times \text{viscosity of elastomer} \times \frac{l_2}{h_2}$$

9. The method of claim 1, 2 or 6 comprising the further step of providing an expansion cavity (14) having a gap height h_1 of 10 to 100 times the height h_2 of said gate.

10. The method of claim 1, 2 or 6 comprising the further step of using a 1 to 6 phr Kevlar pulp as reinforcing fiber in said elastomer.

11. The method of claim 1, 2 or 6 comprising the further step of forming a tire component with said die and the expansion cavity (14) has a length of 1.25 to 5.0 mm.

12. An apparatus for producing an elastomeric component comprising an injection mold (50) having

(a) a chamber (55) for containing an elastomer (54)

(b) a ram (52) for pressing elastomer (54) through sprue (18)

(c) a pneumatic arm (56) associated with a moving mold (10a) and a fixed mold (10b) attached to end (51) of injection mold (50), having die plates (11) disposed therebetween, characterized in that die plates (11) comprise an expansion die (11) for changing the orientation of fibers (20) in an elastomeric material, said expansion

die comprising

(d) at least one inlet (18) for directing an elastomeric material into said die,

(e) a narrow slit or gate (12) for receiving elastomer from said inlet (18), said gate (12) having a height h_2 and a length l_2 adapted to form said elastomer into a ribbon of elastomer (16) and orient fibers (20) in said elastomeric ribbon (16) in the length direction l_2 of said gate.

(f) and a cavity portion (14) adjacent said gate (12), said cavity portion (14) having a length l_1 and height h_1 adapted to collect and compress said ribbon (16) of elastomer and orient said fiber (20) substantially in the height direction of said cavity (14).

10 13. The apparatus of claim 12 comprising injection mold (50) and roller system (70) comprising

(g) scrim take off roll (74) in proximity to pulley (76) which is adapted to direct scrim (72) and extrudate (17) to take up roll (78).

14. An apparatus for producing an elastomeric component comprising a twin screw extruder
15 (30) having

(h) at least one inlet port (32) and a plurality of mixing segments (34,36,38,40) and an extrusion end (31)

(i) a die (11a) having a tapered runner (22) attached to said extrusion end (31) such that elastomer exiting extrusion end (31) enters tapered runner (22) and is forced
20 through gate (12) into expansion cavity (14).

15. An apparatus for producing an elastomeric component comprising an injection mold (50) and roller system (70) comprising a scrim take off roll (74) in proximity to pulley (76) which is adapted to direct scrim (72) and extrudate (17) to take up roll (78).

16. The apparatus of claim 12 wherein the expansion die (11) has a width W which
25 corresponds substantially with the width of an elastomeric product or component.

17. The apparatus of claim 16 wherein an expansion die (11) has a gate (12) having a length of 1.25 to 5.0 mm and a height h_2 of said gate is 0.125 to 0.250 mm, and the ratio of said height to said length is 1/400 to 10/400.

18. A pneumatic tire (80) comprising at least a pair of annular beads (82), at least one carcass
30 ply (84) wrapped around said beads, tread (86) disposed over said carcass plies in a crown portion (88) of said tire, and sidewalls (89) disposed between said tread and said beads, wherein said tread (86) comprises a rubber compound containing short fibers (20) oriented substantially perpendicular to the surface of said tread, wherein a tread component used to form said tread (86) is made by forcing tread rubber through an expanding die.

19. The tire of claim 18 wherein said tread (86) is made by extending a narrow component of fiber reinforced tread rubber through an expanding die (11), and laying said tread rubber in the crown area (88) of a tire.

20. The tire of claim 18 wherein said tread rubber component comprises a plurality of turns on
5 said tire carcass.

21. The tire of claim 18 wherein said tread (86) is divided into regions (21,21a,21b), and wherein fiber reinforcement (20,20a,20b) is oriented in a specific region independently of the orientation of the fiber reinforcement in other regions.

22. The tire of claim 18 wherein a center region and an outside shoulder of the tread have fiber
10 orientation perpendicular to the road contacting surface of the tread, and an inside shoulder of the tire has fiber orientation parallel to the road contacting surface of the tread.

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference DN1999186PCT	FOR FURTHER ACTION		see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.
International application No. PCT/US 99/ 20389	International filing date (day/month/year) 07/09/1999	(Earliest) Priority Date (day/month/year)	
Applicant THE GOODYEAR TIRE & RUBBER COMPANY et al.			

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.



It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

- a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.



the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :



contained in the international application in written form.



filed together with the international application in computer readable form.



furnished subsequently to this Authority in written form.



furnished subsequently to this Authority in computer readable form.



the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.



the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☐ **Unity of invention is lacking** (see Box II).

4. With regard to the title,



the text is approved as submitted by the applicant.



the text has been established by this Authority to read as follows:

5. With regard to the abstract,



the text is approved as submitted by the applicant.



the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.



as suggested by the applicant.



because the applicant failed to suggest a figure.



because this figure better characterizes the invention.

1



None of the figures.

INTERNATIONAL SEARCH REPORT

International Application No

US 99/20389

A. CLASSIFICATION OF SUBJECT MATTER
 IPC 7 B29C47/00 B60C11/00 //B29K21:00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 B29C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 98 13185 A (CHANG CHING CHIAN ;VOGLIANO ROBERT HENRY (US); SHAW CHENG (US); GO) 2 April 1998 (1998-04-02) cited in the application page 2, line 12 - line 30 page 9, line 24 - line 26; figures 1-3 ---	1, 18-22
X	US 4 925 512 A (BRIAND JEAN P) 15 May 1990 (1990-05-15) column 9, line 49 - line 56; figure 1 ---	15
A	PATENT ABSTRACTS OF JAPAN vol. 014, no. 093 (M-0939), 21 February 1990 (1990-02-21) & JP 01 304924 A (BANDO CHEM IND LTD), 8 December 1989 (1989-12-08) cited in the application abstract --- -/--	12, 14



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

17 April 2000

Date of mailing of the international search report

26/04/2000

Name and mailing address of the ISA

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Authorized officer

Attalla, G

INTERNATIONAL SEARCH REPORT

International Application No

/US 99/20389

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 468 306 A (BANDO CHEMICAL IND) 29 January 1992 (1992-01-29) cited in the application abstract -----	12, 14
A	US 5 132 549 A (ALLAN PETER S ET AL) 21 July 1992 (1992-07-21) abstract; figure 5 -----	1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

US 99/20389

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 9813185	A	02-04-1998	AU 7369396 A EP 0929389 A	17-04-1998 21-07-1999
US 4925512	A	15-05-1990	FR 2528350 A AU 1549883 A BE 896998 A CA 1225215 A CH 653605 A DE 3320550 A DK 268983 A, B, ES 523121 D ES 8500586 A ES 532658 D ES 8505868 A FI 831994 A, B, GB 2126150 A, B GR 81325 A HK 63187 A IE 54342 B IT 1218720 B JP 1806723 C JP 5014605 B JP 59052637 A LU 84848 A NL 8302064 A, B, NO 177895 B NZ 204515 A PT 76852 A, B SE 462746 B SE 8303290 A SG 23887 G ZA 8304126 A	16-12-1983 15-12-1983 03-10-1983 11-08-1987 15-01-1986 15-12-1983 12-12-1983 16-11-1984 16-01-1985 01-07-1985 16-10-1985 12-12-1983 21-03-1984 11-12-1984 11-09-1987 30-08-1989 19-04-1990 10-12-1993 25-02-1993 27-03-1984 17-11-1983 02-01-1984 04-09-1995 11-07-1986 01-07-1983 27-08-1990 12-12-1983 18-09-1987 25-07-1984
JP 01304924	A	08-12-1989	JP 1883071 C JP 6009847 B	10-11-1994 09-02-1994
EP 0468306	A	29-01-1992	JP 1921374 C JP 4071808 A JP 6051293 B JP 1905490 C JP 4072332 A JP 6033339 B JP 1955446 C JP 4080013 A JP 6088303 B JP 1943928 C JP 4082724 A JP 6073894 B CA 2046722 A DE 69113552 D DE 69113552 T DE 69131720 D DE 69131720 T EP 0657272 A US 5522719 A US 5281380 A	07-04-1995 06-03-1992 06-07-1994 08-02-1995 06-03-1992 02-05-1994 28-07-1995 13-03-1992 09-11-1994 23-06-1995 16-03-1992 21-09-1994 13-01-1992 09-11-1995 15-05-1996 18-11-1999 02-03-2000 14-06-1995 04-06-1996 25-01-1994
US 5132549	A	21-07-1992	AT 81055 T	15-10-1992

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

/US 99/20389

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5132549 A		AU 626370 B	30-07-1992
		AU 4824990 A	13-08-1990
		CA 2007349 A,C	10-07-1990
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		EP 0403637 A	27-12-1990
		WO 9008024 A	26-07-1990
		GB 2237237 A,B	01-05-1991
		HK 16894 A	11-03-1994
		JP 6079826 B	12-10-1994
		JP 3500400 T	31-01-1991

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

PCT

NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL SEARCH REPORT
OR THE DECLARATION

(PCT Rule 44.1)

*mtel
DEW
5-9-2000*

T:

THE GOODYEAR TIRE & RUBBER COMPANY
Department 823
Attn. Wheeler, David E.
1144 East Market Street
Akron, Ohio 44316-0001
UNITED STATES OF AMERICA

Date of mailing
(day/month/year)

26/04/2000

Applicant's or agent's file reference

DN1999186PCT

FOR FURTHER ACTION

See paragraphs 1 and 4 below

International application No.

PCT/US 99/ 20389

International filing date
(day/month/year)

07/09/1999

Applicant

THE GOODYEAR TIRE & RUBBER COMPANY et al.

1. ☒ The applicant is hereby notified that the International Search Report has been established and is transmitted herewith.

Filing of amendments and statement under Article 19:

The applicant is entitled, if he so wishes, to amend the claims of the International Application (see Rule 46):

When? The time limit for filing such amendments is normally 2 months from the date of transmittal of the International Search Report; however, for more details, see the notes on the accompanying sheet.

Where? Directly to the International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland
Facsimile No.: (41-22) 740.14.35

For more detailed instructions, see the notes on the accompanying sheet.

2. ☐ The applicant is hereby notified that no International Search Report will be established and that the declaration under Article 17(2)(a) to that effect is transmitted herewith.

3. ☐ With regard to the protest against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

☐ the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.

☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Further action(s):** The applicant is reminded of the following:

Shortly after 18 months from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules 90bis.1 and 90bis.3, respectively, before the completion of the technical preparations for international publication.

Within 19 months from the priority date, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase until 30 months from the priority date (in some Offices even later).

Within 20 months from the priority date, the applicant must perform the prescribed acts for entry into the national phase before all designated Offices which have not been elected in the demand or in a later election within 19 months from the priority date or could not be elected because they are not bound by Chapter II.

Name and mailing address of the International Searching Authority



European Patent Office, P.B. 5818 Patentlaan 2
NL-2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 po nl,
Fax: (+31-70) 340-3016

Authorized officer

Sandrine Polenzani

RECEIVED

MAY - 3 2000

GOODYEAR PATENT
& TRADEMARK DEPT

MAY 04 2000

NOTES TO FORM PCT/ISA/220

These Notes are intended to give the basic instructions concerning the filing of amendments under article 19. The Notes are based on the requirements of the Patent Cooperation Treaty, the Regulations and the Administrative Instructions under that Treaty. In case of discrepancy between these Notes and those requirements, the latter are applicable. For more detailed information, see also the PCT Applicant's Guide, a publication of WIPO.

In these Notes, "Article", "Rule", and "Section" refer to the provisions of the PCT, the PCT Regulations and the PCT Administrative Instructions respectively.

INSTRUCTIONS CONCERNING AMENDMENTS UNDER ARTICLE 19

The applicant has, after having received the international search report, one opportunity to amend the claims of the international application. It should however be emphasized that, since all parts of the international application (claims, description and drawings) may be amended during the international preliminary examination procedure, there is usually no need to file amendments of the claims under Article 19 except where, e.g. the applicant wants the latter to be published for the purposes of provisional protection or has another reason for amending the claims before international publication. Furthermore, it should be emphasized that provisional protection is available in some States only.

What parts of the international application may be amended?

Under Article 19, only the claims may be amended.

During the international phase, the claims may also be amended (or further amended) under Article 34 before the International Preliminary Examining Authority. The description and drawings may only be amended under Article 34 before the International Examining Authority.

Upon entry into the national phase, all parts of the international application may be amended under Article 28 or, where applicable, Article 41.

When?

Within 2 months from the date of transmittal of the international search report or 16 months from the priority date, whichever time limit expires later. It should be noted, however, that the amendments will be considered as having been received on time if they are received by the International Bureau after the expiration of the applicable time limit but before the completion of the technical preparations for international publication (Rule 46.1).

Where not to file the amendments?

The amendments may only be filed with the International Bureau and not with the receiving Office or the International Searching Authority (Rule 46.2).

Where a demand for international preliminary examination has been/is filed, see below.

How?

Either by cancelling one or more entire claims, by adding one or more new claims or by amending the text of one or more of the claims as filed.

A replacement sheet must be submitted for each sheet of the claims which, on account of an amendment or amendments, differs from the sheet originally filed.

All the claims appearing on a replacement sheet must be numbered in Arabic numerals. Where a claim is cancelled, no renumbering of the other claims is required. In all cases where claims are renumbered, they must be renumbered consecutively (Administrative Instructions, Section 205(b)).

The amendments must be made in the language in which the international application is to be published.

What documents must/may accompany the amendments?

Letter (Section 205(b)):

The amendments must be submitted with a letter.

The letter will not be published with the international application and the amended claims. It should not be confused with the "Statement under Article 19(1)" (see below, under "Statement under Article 19(1)").

The letter must be in English or French, at the choice of the applicant. However, if the language of the international application is English, the letter must be in English; if the language of the international application is French, the letter must be in French.

The letter must indicate the differences between the claims as filed and the claims as amended. It must, in particular, indicate, in connection with each claim appearing in the international application (it being understood that identical indications concerning several claims may be grouped), whether

- (i) the claim is unchanged;
- (ii) the claim is cancelled;
- (iii) the claim is new;
- (iv) the claim replaces one or more claims as filed;
- (v) the claim is the result of the division of a claim as filed.

The following examples illustrate the manner in which amendments must be explained in the accompanying letter:

1. [Where originally there were 48 claims and after amendment of some claims there are 51]:
"Claims 1 to 29, 31, 32, 34, 35, 37 to 48 replaced by amended claims bearing the same numbers; claims 30, 33 and 36 unchanged; new claims 49 to 51 added."
2. [Where originally there were 15 claims and after amendment of all claims there are 11]:
"Claims 1 to 15 replaced by amended claims 1 to 11."
3. [Where originally there were 14 claims and the amendments consist in cancelling some claims and in adding new claims]:
"Claims 1 to 6 and 14 unchanged; claims 7 to 13 cancelled; new claims 15, 16 and 17 added." or
"Claims 7 to 13 cancelled; new claims 15, 16 and 17 added; all other claims unchanged."
4. [Where various kinds of amendments are made]:
"Claims 1-10 unchanged; claims 11 to 13, 18 and 19 cancelled; claims 14, 15 and 16 replaced by amended claim 14; claim 17 subdivided into amended claims 15, 16 and 17; new claims 20 and 21 added."

"Statement under article 19(1)" (Rule 46.4)

The amendments may be accompanied by a statement explaining the amendments and indicating any impact that such amendments might have on the description and the drawings (which cannot be amended under Article 19(1)).

The statement will be published with the international application and the amended claims.

It must be in the language in which the international application is to be published.

It must be brief, not exceeding 500 words if in English or if translated into English.

It should not be confused with and does not replace the letter indicating the differences between the claims as filed and as amended. It must be filed on a separate sheet and must be identified as such by a heading, preferably by using the words "Statement under Article 19(1)."

It may not contain any disparaging comments on the international search report or the relevance of citations contained in that report. Reference to citations, relevant to a given claim, contained in the international search report may be made only in connection with an amendment of that claim.

Consequence if a demand for international preliminary examination has already been filed

If, at the time of filing any amendments under Article 19, a demand for international preliminary examination has already been submitted, the applicant must preferably, at the same time of filing the amendments with the International Bureau, also file a copy of such amendments with the International Preliminary Examining Authority (see Rule 62.2(a), first sentence).

Consequence with regard to translation of the international application for entry into the national phase

The applicant's attention is drawn to the fact that, where upon entry into the national phase, a translation of the claims as amended under Article 19 may have to be furnished to the designated/elected Offices, instead of, or in addition to, the translation of the claims as filed.

For further details on the requirements of each designated/elected Office, see Volume II of the PCT Applicant's Guide.

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference DN1999186PCT	FOR FURTHER ACTION		see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.
International application No. PCT/US 99/ 20389	International filing date (day/month/year) 07/09/1999	(Earliest) Priority Date (day/month/year)	
Applicant THE GOODYEAR TIRE & RUBBER COMPANY et al.			

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the language, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international search was carried out on the basis of the sequence listing :

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ Certain claims were found unsearchable (See Box I).

3. ☐ Unity of Invention is lacking (see Box II).

4. With regard to the title,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the abstract,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the drawing to be published with the abstract is Figure No.

☒ as suggested by the applicant.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

1
☐ Non of the figures.

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 99/20389

A. CLASSIFICATION OF SUBJECT MATTER
 IPC 7 B29C47/00 B60C11/00 //B29K21:00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 B29C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 98 13185 A (CHANG CHING CHIAN ;VOGLIANO ROBERT HENRY (US); SHAW CHENG (US); GO) 2 April 1998 (1998-04-02) cited in the application page 2, line 12 - line 30 page 9, line 24 - line 26; figures 1-3	1,18-22
X	US 4 925 512 A (BRIAND JEAN P) 15 May 1990 (1990-05-15) column 9, line 49 - line 56; figure 1	15
A	PATENT ABSTRACTS OF JAPAN vol. 014, no. 093 (M-0939), 21 February 1990 (1990-02-21) & JP 01 304924 A (BANDO CHEM IND LTD), 8 December 1989 (1989-12-08) cited in the application abstract	12,14



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

17 April 2000

Date of mailing of the international search report

26/04/2000

Name and mailing address of the ISA

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 Fax: (+31-70) 340-3016

Authorized officer

Attalla, G

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 99/20389

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 468 306 A (BANDO CHEMICAL IND) 29 January 1992 (1992-01-29) cited in the application abstract	12,14
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